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(56) Documents Cited  
GB 2029070 A GB 1556924 A EP 0282712 A2  
EP 0264782 A2 US 5147969 A US 4860364 A  
US 4627324 A

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UK CL (Edition P ) G5J JCU JEBA JEGA JEGX JER  
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(54) Abstract Title  
**Electronic sound generating apparatus**

(57) A sound generating apparatus, suitable for use with young children, comprises sensing means 6, 8 for attaching to one or more parts of the body and electronic sound generating means 2 for producing a sound according to the output of the sensing means. The sensors are motion or impact sensing transducers which comprise means for transmitting a radio frequency signal to the sound generating means according to the output from the transducer. When using the apparatus a child will tend to choreograph his or her motions to produce a rhythmical sound pattern, thus leading to an improvement in co-ordination and timing.

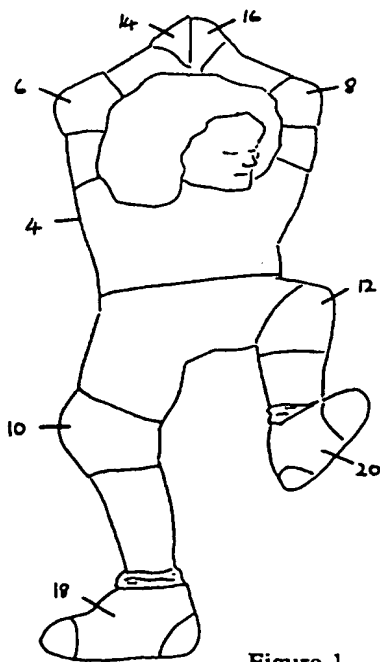


Figure 1

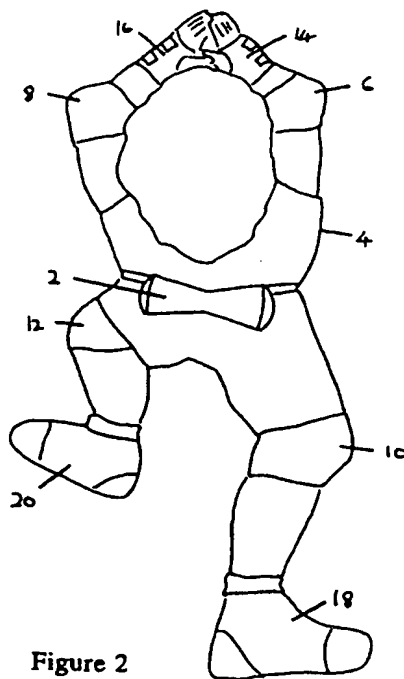


Figure 2

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The claims were filed later than the filing date within the period prescribed by Rule 25(1) of the Patents Rules 1995

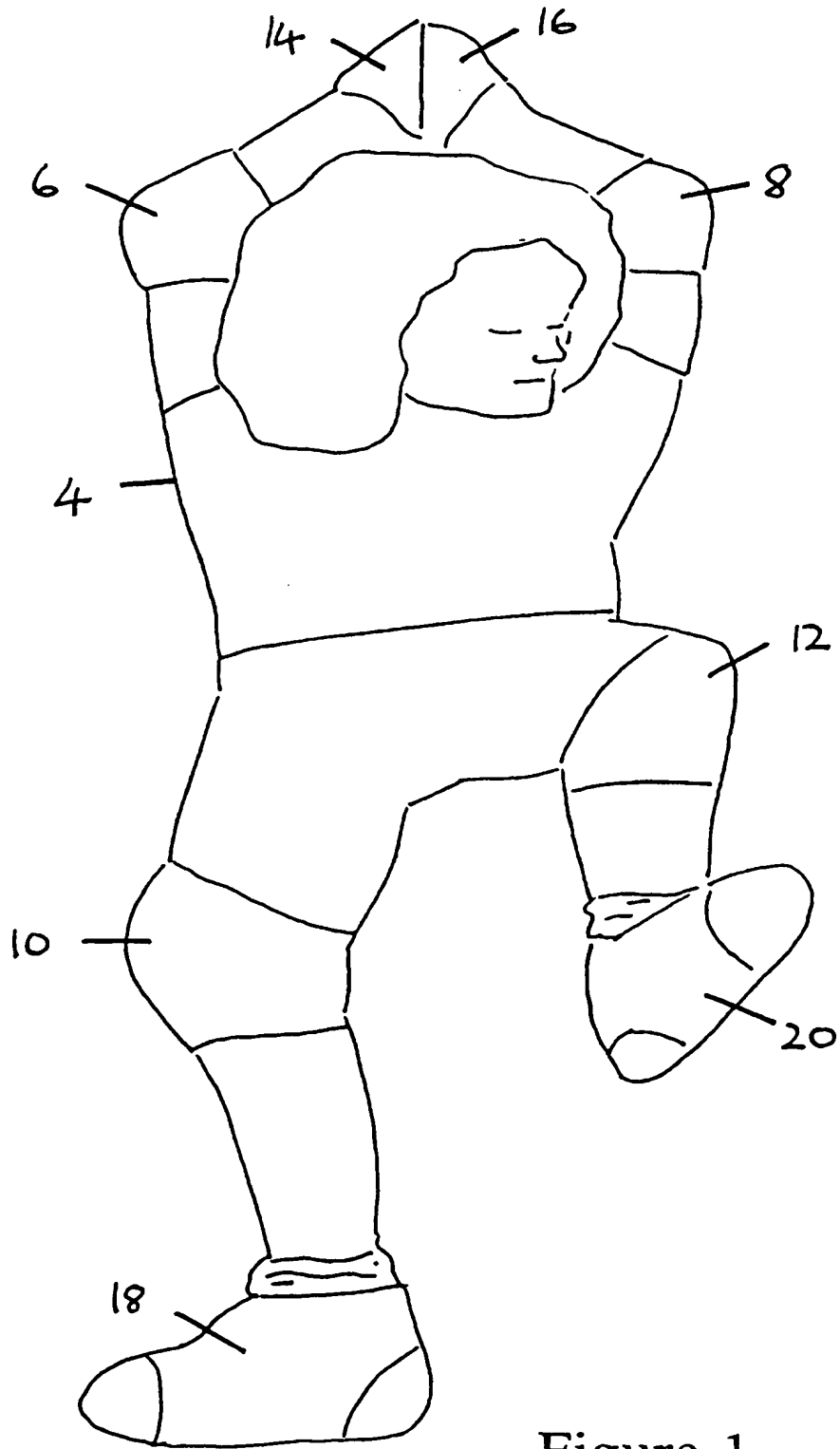


Figure 1

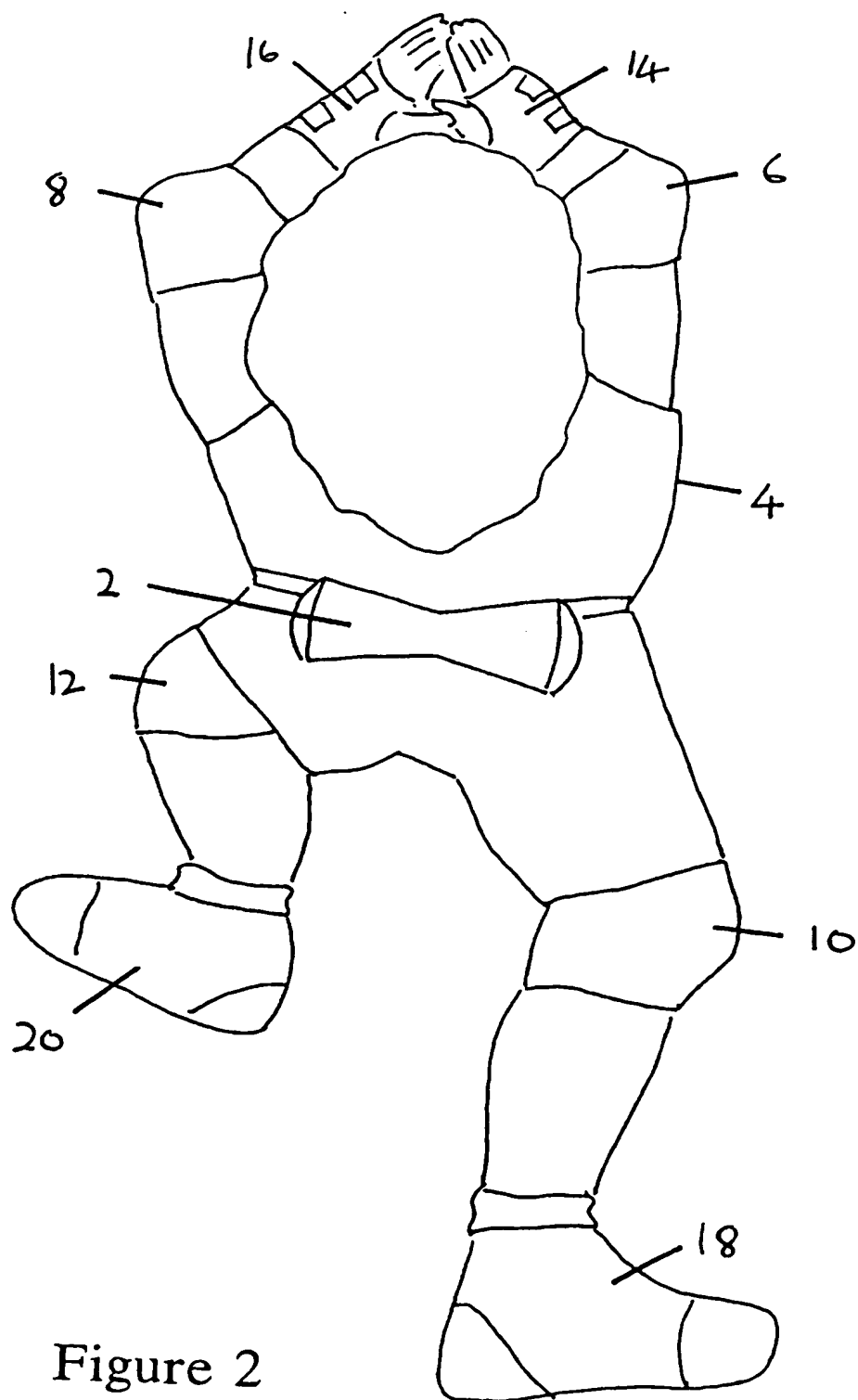


Figure 2

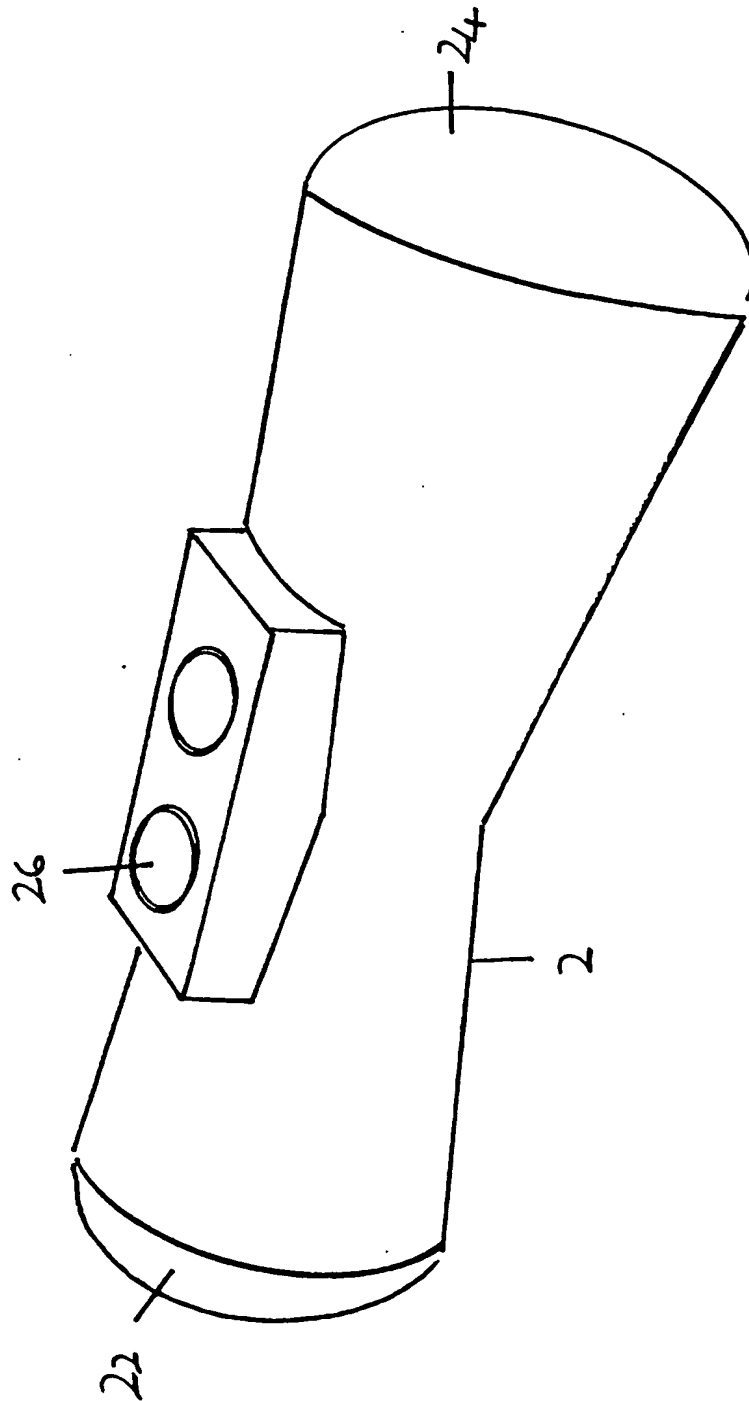


Figure 3

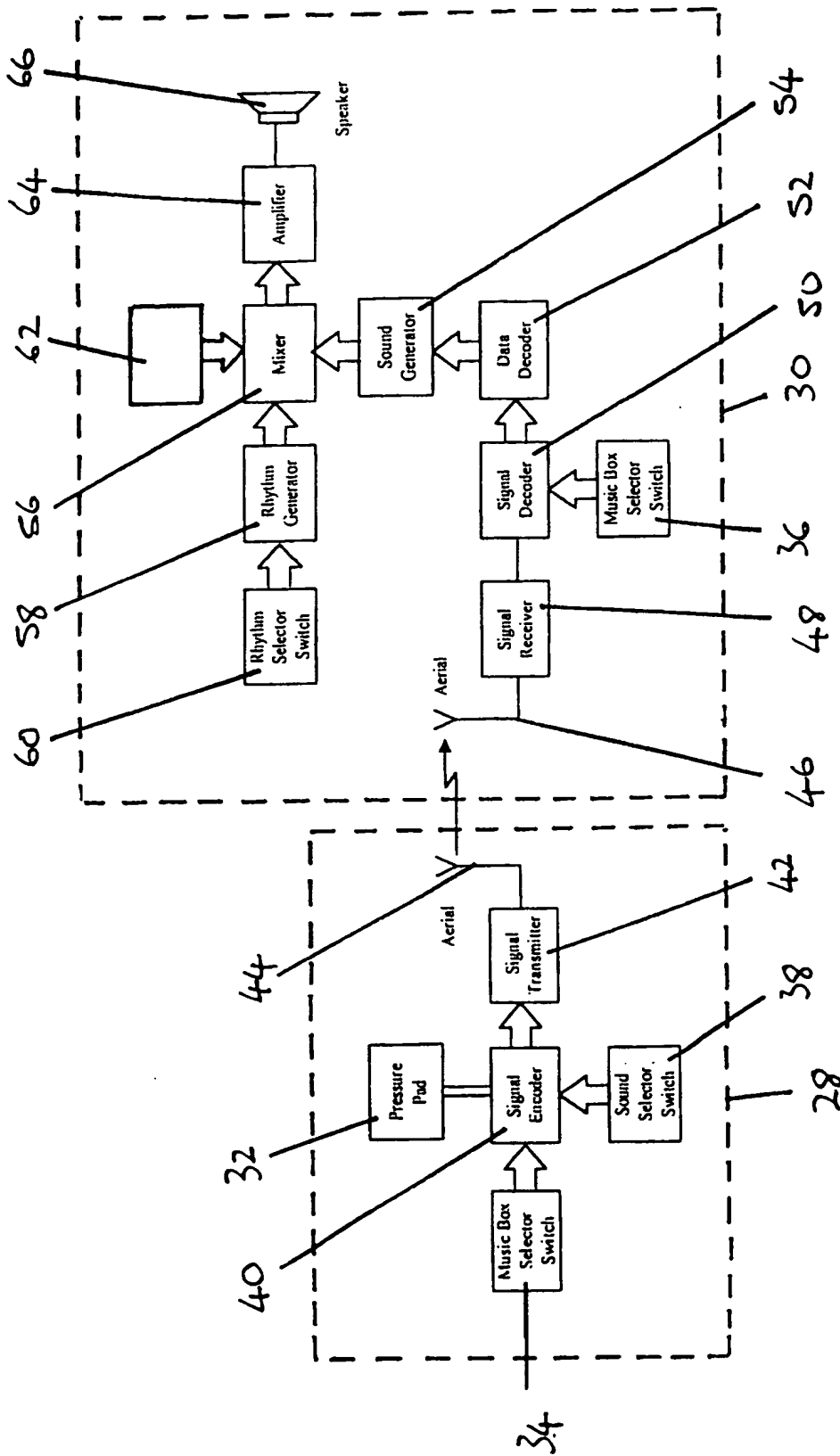


Figure 4

ELECTRONIC SOUND GENERATING APPARATUS

The present invention relates to an electronic sound generating apparatus.

Whilst a great many types of sound generating apparatus are known, very few of these are suitable for use by young children with little musical ability. For example, most musical instruments other than percussive instruments require the musician to have a high degree of manual dexterity. Even percussive instruments, being limited in the sounds that they can produce, quickly become tiresome for children.

I have now devised a sound generating apparatus which is appealing to young children and which encourages them to develop their sense of coordination and timing.

In accordance with the present invention there is provided a sound generating apparatus comprising sensing means for attaching to one or more parts of the body and electronic sound generating means for producing a sound according to the output of said sensing means.

Such an apparatus is relatively simple to use and is capable of generating a large variety of sounds. The apparatus is therefore very appealing to children. Also, it has been found that the child will tend to choreograph his or her motions to produce a rhythmical sound pattern, thus leading to an improvement in his or her coordination and timing.

Preferably the sensing means comprises one or more motion or impact sensing transducers. The sensing means may, for example, comprise a motion or impact sensing transducer arranged to be worn on the arm over the elbow, on the leg over the knee, as a glove upon the hand or as a shoe upon the foot. Preferably the or each transducer is attached to a respective part of the body by an elastomeric sleeve.

Where the apparatus comprises more than one transducer, then the electronic sound generating means may comprise a separate sound generating device for each transducer. However, preferably the electronic sound generating means comprises a single sound generating device for all transducers.

Preferably the sound generating means comprises means

to determine whether or not it is to respond to the output of a particular transducer.

The electronic sound generating means may produce identical sounds or different sounds according to the outputs  
5 of respective transducers. Preferably the apparatus comprises means for selecting which of a plurality of sounds is to be produced by said sound generating means according to the output of a particular transducer.

Preferably the electronic sound generating means  
10 comprises means for producing a tune or rhythm as an accompaniment to the sounds produced in response to the output of the sensing means. For example, the electronic sound generating means may comprise an electronic drum machine having various preset rhythms of variable tempo.

15 Preferably the sound generating means comprises means for producing an audio output via a set of headphones.

Preferably, the or each transducer comprises means for transmitting a radio frequency signal to the sound generating means according to the output from the transducer.

20 The transmitted signal may comprise a coded signal identifying a particular transducer, a particular sound being allocated to each transducer by the sound generating means. However, preferably the transmitted signal comprises a coded signal directly representing the sound to be produced by the  
25 sound generating means.

The radio frequency signal may also comprise a coded channel signal, the sound generating means being arranged to respond only to those transducer signals having the required coded channel signal. Thus, more than one sound generating  
30 apparatus may be used in close proximity.

Preferably both the sound signal and the channel signal for each transducer may be selected from a plurality of possible signals, for example by manually setting respective switches. Preferably the sound generating means comprises means  
35 for selecting, from a plurality of possible signals, the particular channel signal to which it will respond.

The signal coding scheme is intended so that, where the sensing means comprises more than one transducer and/or more than one apparatus is to be used in close proximity, then each

transmitting means may transmit at the same frequency. Thus, receiver complexity in the sound generating means is reduced. Crosstalk between the transmitted signals has been found to be minimal due to the transducer outputs typically being delayed  
5 by a short period with respect to one another.

In use, a plurality of motion or impact sensing transducers would typically be attached to various parts of a person's body so that as that person performs a dance, the motions of his or her arms, legs, etc. cause musical or  
10 percussive sounds to be produced by the electronic sound generating means. By attempting to synchronise those sounds with an accompanying tune or rhythm, also produced by the sound generating means, the person's sense of coordination and timing will, over a period of time, be gradually improved.

15 Rather than using the apparatus as a musical instrument, the sound generating means may instead be arranged to produce a range of other sampled or simulated sounds so that, for example, two or more apparatus to be used to increase the realism of persons engaged in simulated hand-to-hand  
20 combat.

An embodiment of the present invention will now be described by way of example only and with reference to the accompanying drawings, in which:

Figure 1 is a front view of a person wearing an  
25 electronic sound generating apparatus in accordance with the present invention;

Figure 2 is a corresponding rear view of the person shown in Figure 1;

Figure 3 is a perspective view of a preferred sound  
30 generating means; and,

Figure 4 is a functional block diagram representation of the instrument.

Referring to Figures 1 and 2 of the drawings, an  
35 electronic sound generating apparatus is shown comprising an electronic sound generating means 2, which is worn about the waist of a person 4 and which is responsive to inputs received by means of radio frequency transmissions from each of a plurality of impact sensing transducer units.



The transducer units are attached to a various parts of the person's body by elastomeric sleeves and comprise a first pair of transducers 6,8 worn on the arms over the elbows, a second pair of transducers 10,12 worn on the legs over the knees, a third pair of transducers 14,16 worn as gloves upon the hands and a fourth pair of transducers 18,20 worn as shoes upon the feet.

Figure 3 shows a preferred sound generating means 2 comprising a pair of speakers 22,24, a volume control 26 and one or more additional switches, etc. which may be used, for example, to select an accompaniment rhythm or a desired operating channel.

Whilst not shown, the sound generating means may additionally comprise a cassette deck or compact disc player to provide accompaniment music for the musician.

The sound generating means shown is intended to be worn about the waist, however it may instead comprise a hand-held unit which may be carried by the musician and deposited by him at some convenient location.

The respective electronic circuitry for each transducer unit 28 and a corresponding sound generating means 30 are shown schematically in Figure 4.

Referring to Figure 4, each transducer unit 28 comprises a pressure pad 32 which produces an output signal when an instantaneous force or impact is applied to it.

A channel selector switch 34 determines which of a plurality of sound generating means is to respond to the impact signal. A corresponding channel selector switch 36 in each sound generating means enables a number of instruments to operate in close proximity without interfering with one another.

A second switch 38 determines which of a plurality of sounds is to be produced by the sound generating means in response to the impact signal.

A signal encoder 40 combines the impact signal from the pressure pad 32 with the signals supplied by the channel and sound selector switches 34 and 38 to produce an encoded signal which is modulated onto a radio frequency carrier by a transmitter unit 42 and transmitted via an aerial 44 to a

respective sound generating means 30.

The radio frequency signal is received by an aerial 46 in the sound generating means and demodulated by a receiver unit 48. The resulting signal is decoded by decoding means 50 and 52, which respectively determine whether the sound generating means should respond to the signal (where both channel selector switches 34 and 36 are set to the same channel) and, if so, the required sound to be generated by the sound generator 54.

10 The output of the sound generator 54 is combined by mixer 56 with an accompaniment rhythm signal generated by a rhythm generator 58, different rhythms being selected by means of a switch 60.

Additional signals 62 may be supplied to mixer 56, for 15 example musical signals from a music recording or other instrument, which signals provide alternative or additional accompaniment for the musician.

Finally, the mixed signal is converted into an audio output by an amplifier 64 and speaker 66 arrangement. 20 Preferably additional outputs are also provided, such as a headphone output and a musical instrument digital interface (MIDI) output.

It will be appreciated that, as an alternative to the preferred arrangement described above, each transmitting means 25 may transmit at a different frequency. Thus, the requirement for a unique coded identification signal to differentiate between different transducer output signals would be obviated, however receiver complexity would be correspondingly increased. Similarly, channel selection may be achieved by providing means 30 for off-setting the transmission frequency of each apparatus by a pre-determined amount.

The apparatus thus described may be used to provide a musical instrument which, being relatively easy to play and capable of generating a large variety of sounds, is 35 particularly appealing to children, whose sense of coordination and timing may be improved through use of the apparatus.

Claims

- 1) A sound generating apparatus comprising sensing means for attaching to one or more parts of the body and electronic sound generating means for producing a sound according to the  
5 output of said sensing means.
- 2) A sound generating apparatus as claimed in Claim 1, wherein said sensing means comprises one or more motion or impact sensing transducers.
- 3) A sound generating apparatus as claimed in Claim 2,  
10 comprising a motion or impact sensing transducer arranged to be worn on the arm over the elbow.
- 4) A sound generating apparatus as claimed in Claim 2, comprising a motion or impact sensing transducer arranged to be worn on the leg over the knee.
- 15 5) A sound generating apparatus as claimed in Claim 2, comprising a motion or impact sensing transducer arranged to be worn as a glove upon the hand.
- 6) A sound generating apparatus as claimed in Claim 2, comprising a motion or impact sensing transducer arranged to  
20 be worn as a shoe upon the foot.
- 7) A sound generating apparatus as claimed in any of Claims 2 to 6, wherein the or each transducer is arranged to be attached to a respective part of the body by an elastomeric sleeve.
- 25 8) A sound generating apparatus as claimed in any of Claims 2 to 7, comprising means for selecting which of a plurality of sounds is to be produced by said sound generating means according to the output of the or each transducer.
- 9) A sound generating apparatus as claimed in any of  
30 Claims 2 to 8, comprising a plurality of transducers, said

electronic sound generating means comprising a separate sound generating device for each said transducer.

10) A sound generating apparatus as claimed in any of Claims 2 to 8, comprising a plurality of transducers, said  
5 electronic sound generating means comprising a single sound generating device for all transducers.

11) A sound generating apparatus as claimed in any of Claims 2 to 10, comprising a plurality of transducers, said  
10 electronic sound generating means being arranged to produce identical sounds according to the outputs of respective transducers.

12) A sound generating apparatus as claimed in any of Claims 2 to 10, comprising a plurality of transducers, said  
15 electronic sound generating means being arranged to produce different sounds according to the outputs of respective transducers.

13) A sound generating apparatus as claimed in any of Claims 2 to 12, wherein the or each transducer comprises means  
20 for transmitting a radio frequency signal to said sound generating means according to the output from said transducer.

14) A sound generating apparatus as claimed in Claim 13, wherein said radio frequency signal comprises a coded signal identifying the or each transducer, a respective sound being allocated to each transducer by said sound generating means.

25 15) A sound generating apparatus as claimed in Claim 13, wherein said radio frequency signal comprises a coded signal directly representing the sound to be produced by said sound generating means.

30 16) A sound generating apparatus as claimed in any of Claims 13 to 15, wherein said radio frequency signal comprises a coded channel signal, said sound generating means being arranged to respond only to those transducer signals having the

required coded channel signal.

17) A sound generating apparatus as claimed in Claim 16, wherein said sound generating means comprises means for selecting, from a plurality of possible signals, the particular  
5 channel signal to which it will respond.

18) A sound generating apparatus as claimed in Claim 16 or Claim 17, wherein both the sound signal and the channel signal for the or each transducer may be selected from a plurality of possible signals.

10 19) A sound generating apparatus as claimed in any preceding claim, wherein said electronic sound generating means comprises means for producing a tune or rhythm as an accompaniment to the sounds produced in response to the output of the sensing means.

15 20) A sound generating apparatus substantially as herein described with reference to the accompanying drawings.



# The Patent Office

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Application No: GB 9710542.3  
Claims searched: 1 to 19

Examiner: Ruth Patterson  
Date of search: 10 March 1998

## Patents Act 1977 Search Report under Section 17

### Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.P): G5J (JEBA, JER, JEGA, JEGX, JESD, JCU)

Int Cl (Ed.6): G10H 1/00, 1/32, 3/00, 5/00.

Other: ONLINE : WPI

### Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
X	GB 2029070 A (P.H. LEWIS) See abstract, figure 1, page 1, lines 13 to 39.	1,2,5,8, 10,12
X	GB 1556924 A (HSING-CHING LIU) see abstract, figures 1, 2, 3, 4 & 5, page 1 lines 18 to 42, page 1, line 70 to page 2, line 35.	1,2,6,10, 12
X	EP 0282712 A2 (YAMAHA CO.) See abstract, figures 5A, 5B, 6, 9, 16A, 16B, 18, column 3, lines 11 to 55, column 5, lines 10 to 42, column 7, line 56 to column 8, line 9	1,2,3,4,7, 8,10
X	EP 0264782 A2 (YAMAHA CO.) See whole document	1,2,3,8, 10
X	US 5147969 A (HIYSHOI et al.) See abstract, figure 11, column 1, line 65 to column 2, line 3, column 8, line 7 to column 9, line 11.	1,2,3,4,7,8 10,12,13
X	US 4860364 A (GIANNINI) See whole document.	1, 2, 3,4,10, 11,13

X Document indicating lack of novelty or inventive step  
Y Document indicating lack of inventive step if combined with one or more other documents of same category.

& Member of the same patent family

A Document indicating technological background and/or state of the art.  
P Document published on or after the declared priority date but before the filing date of this invention.  
E Patent document published on or after, but with priority date earlier than, the filing date of this application.



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Application No: GB 9710542.3  
Claims searched: 1 to 19

Examiner: Ruth Patterson  
Date of search: 10 March 1998

Category	Identity of document and relevant passage	Relevant to claims
X	US 4627324 A (ZWOSTA) See abstract and column 1, line 22 to column 3, line 35.	1,2,3,8, 10,11,12

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.